



III. ALTERNATIVES

The identification and evaluation of feasible improvement alternatives for the I-17 mainline has been conducted to accommodate projected traffic volumes for the 2025 design year. The development of these alternatives incorporated input from other agencies, such as the City of Phoenix, MCDOT, and ASLD, as well as the public. Discussions with MAG and the City of Phoenix also addressed other future arterial roadway improvements, the planned roadway network for north Phoenix, and the I-17 improvements needed to accommodate existing and proposed traffic. The City of Phoenix request for the separation of local traffic on continuous frontage roads to accommodate development between Happy Valley Road and Carefree Highway resulted in the inclusion of frontage road improvements into the I-17 widening project.

A. Alternatives

For the purpose of developing and comparing alternatives, the project improvements were categorized into three elements: mainline I-17, SR 101L TI, and frontage roads. The alternatives identified for each element are identified in Table 4. In addition, the No Action Alternative was considered (page 21).

Table 4 – Alternatives Identified

Element	Limits	Alternatives Identified
Mainline I-17	Rose Garden Lane TI to New River Road TI	Outside Widening Alternative (page 16)
		Inside Widening Alternative (page 17)
SR 101L TI	Utopia Drive/Yorkshire Drive TI to Rose Garden Lane TI	Adding Lanes without Bridge Widening (page 17)
		Adding Lanes with Bridge Widening (page 18)
Frontage Roads	Happy Valley Road TI to Carefree Highway TI	Two-Way Traffic Operations (page 17)
		One-Way Traffic Operations (page 21)

The evaluation criteria included design, environmental, and socioeconomic considerations that were developed during the agency and public involvement process. These criteria were used to determine the viability of the alternatives to be selected for further study. The criteria used in the initial screening process included:

- Traffic operations
- Minimizing impacts to existing structures
- Minimizing right-of-way (R/W) acquisition
- Minimizing environmental and socioeconomic impacts
- Drainage considerations
- Constructability
- Maximizing cost-effectiveness

The assessment of alternatives also addressed factors such as land use, projected development, jurisdiction, ownership, zoning, water resources, biological impacts, air quality, noise, hazardous materials, and cultural resources.



1. Alternatives Considered but Eliminated from Further Study

I-17 Mainline: Outside Widening

An Outside Widening Alternative was considered for the segment of I-17 between Rose Garden Lane and New River Road. Typical section sheets for this alternative are located in Appendix A (pages A-1 to A-5). This alternative would involve widening the roadway by placing new lanes to the outside of the existing I-17 travel lanes. Five general purpose travel lanes and an HOV lane would be constructed in each direction from Rose Garden Lane to Carefree Highway. North of Carefree Highway, four general purpose travel lanes and an HOV lane in each direction would extend to New River Road. Auxiliary lanes would be provided between Deer Valley Road and Jomax Road to accommodate traffic weaving movements.

New pavement would be added only to the outside of the existing paved road surface. For the outside widening, the inside shoulder, HOV lane, and one travel lane in each direction would be located on the existing I-17 pavement. South of Carefree Highway, the additional R/W required would vary between 33 and 106 ft east of I-17, and 25 to 87 ft west of I-17. North of Carefree Highway, 22 to 71 ft of additional R/W would be required east of I-17, and 20 to 67 ft to the west.

The Outside Widening Alternative would have less of a visual impact on the rural character of the northern project area, would provide a wider separation between the northbound and southbound roadways, and provide easier access across the median for emergency vehicles than widening to the inside. However, the Outside Widening Alternative was eliminated from further consideration for the following reasons:

- Widening to the outside would require the relocation of frontage roads between Rose Garden Lane and Pinnacle Peak Road, between Happy Valley Road and Dixileta Road, and north of Anthem Way. As a result, additional R/W would be required from existing and planned adjacent commercial and residential properties. The Inside Widening Alternative (page 17) would require substantially less new R/W than this alternative.
- Widening I-17 to the outside would require reconstruction of the TI structures at Pinnacle Peak Road, Happy Valley Road, Carefree Highway, Pioneer Road, and Anthem Way. In addition, the Daisy Mountain Road TI currently under construction would not accommodate this alternative. These reconstruction projects would substantially increase project costs, increase construction duration, and cause greater traffic delays during construction than the Inside Widening Alternative.
- Due to its R/W requirements, the Outside Widening Alternative would substantially increase impacts to cultural resources, floodplains, waters of the U.S., biological resources, and residential areas. In addition, the Outside Widening Alternative could require costly modifications to the Skunk Creek hydraulic structure that conveys floodwaters under I-17.
- The Outside Widening Alternative would involve substantially greater project costs due to R/W acquisition and structural modifications at TIs than would occur with the Inside Widening Alternative.



SR 101L TI: Adding Lanes without Bridge Widening

This alternative would provide additional lanes on I-17 through the SR 101L TI without widening the existing SR 101L structures that pass over I-17 and its frontage roads. If these structures were not widened, a narrower roadway cross section with reduced widths for travel lanes and shoulders would be required. This alternative would provide five 11-ft lanes, a 3-ft inside shoulder, and a 10.5-ft outside shoulder in each direction. The narrower lane and shoulder widths would extend approximately 2,000 ft along the freeway. Because these widths would not conform to guidelines for highway design established by the American Association of State Highway and Transportation Officials or ADOT's roadway design guidelines, this alternative was eliminated from further consideration. In addition, the narrower lane and shoulder widths would provide less efficient traffic flow than wider lanes, contributing to congestion and vehicle conflicts.

Frontage Roads: Two-Way Traffic Operations

This alternative would involve extending the existing frontage roads to provide continuous two-way frontage roads from Happy Valley Road north to Carefree Highway and converting existing one-way frontage roads to two-way operations. The new frontage roads would be constructed by the City of Phoenix in conjunction with the construction of new TIs at Jomax Road, Dixileta Road, Lone Mountain Road, and Dove Valley Road.

This alternative was eliminated from further study because:

- Headlights from opposing traffic on I-17 and the frontage road could cause undesirable operational problems due to driver confusion resulting from headlight glare. One-way frontage roads (page 21) avoid this problem and are preferable in congested urban settings.
- Operational problems would occur when connecting two-way frontage roads to the crossroads at TIs. A two-way frontage road does not operate efficiently when it is immediately adjacent to an exit ramp terminal. In order to operate efficiently, the two-way frontage road intersections with the interchange crossroads must be located a minimum of 0.25 mile from I-17, which would require additional R/W and increase project costs. One-way frontage roads would not require this additional offset from I-17.

2. Alternatives Considered for Further Study

I-17 Mainline: Inside Widening

An Inside Widening Alternative was considered for the segment of I-17 between Rose Garden Lane and New River Road. Typical section sheets for this alternative are found in Appendix A (pages A-6 to A-10). This alternative would involve widening the roadway by placing new lanes to the inside of the existing I-17 travel lanes, utilizing the existing median area. Like the Outside Widening Alternative (page 16), this alternative would provide five general purpose travel lanes and an HOV lane in each direction between Rose Garden Lane and Carefree Highway and four general purpose lanes plus an HOV lane between Carefree Highway and New River Road.

In most locations south of Carefree Highway, the frontage roads would need to be shifted outward to accommodate auxiliary lanes that would be provided outside of the general purpose



lanes to facilitate weaving traffic movements between the existing and proposed TIs north of Rose Garden Lane.

Proposed drainage improvements would include a drainage channel, 24 to 36 ft wide and 3 to 6 ft deep, on the east side of I-17 to collect and transport runoff between Skunk Creek and Scatter Wash. This channel would discharge into Scatter Wash. In addition, a detention basin is proposed south of Scatter Wash on the west side of I-17 to accommodate runoff from the widened pavement and to provide adequate drainage in the area.

A median barrier would be provided and the existing median would be paved to accommodate the additional shoulder and HOV lanes. North of Happy Valley Road, where the median widens, the median would accommodate part or all of two additional travel lanes. An outside travel lane and shoulder, and, in some places, an auxiliary lane, would extend beyond the existing paved roadway.

From Rose Garden Lane to Carefree Highway, the total pavement width for each direction of travel (including a median barrier and auxiliary lane and excluding frontage roads) would vary from 99 to 109 ft. The section from Carefree Highway to New River Road would have a total pavement width of 85 to 97 ft in each direction, including auxiliary lanes. Where additional R/W is required, the project would extend the existing R/W by 18 to 30 ft in many locations, and up to 91 ft where drainage improvements are required.

To accommodate this alternative, the bridges across Skunk Creek, the CAP Canal, Deadman Wash, and the New River would require widening. The Deer Valley Road TI overpass would require widening on both sides, while the TI structures at Pinnacle Peak Road and Happy Valley Road would require replacement. The Pioneer Road TI structure would require modification and the New River Road TI overpass would require widening on both sides.

SR 101L TI: Adding Lanes with Bridge Widening

This alternative (Figure 7) would provide additional lanes on I-17 through the SR 101L TI and would include the widening of the existing I-17 structures that pass over SR 101L and the eastbound and westbound frontage roads. There is room to implement uniform widening of the I-17 northbound bridge over the north frontage road along SR 101L and the I-17 northbound and southbound bridges over SR 101L and its south frontage road. However, there is not adequate width to implement uniform widening on the west side of the single-span southbound bridge over the north frontage road along SR 101L due to conflicts with the existing pier under the southbound to eastbound ramp. This bridge would require a tapered widening.

The proposed widening through the SR 101L TI would provide four travel lanes (three general purpose lanes, an HOV lane, and an auxiliary lane) in each direction in the interior of the TI at the SR 101L overpass. Immediately to the north, ramps to Rose Garden Lane to the north would decrease the northbound I-17 cross section in each direction to four travel lanes (three general purpose travel lanes and an HOV lane), until the SR 101L ramps increase I-17 northbound and southbound to six travel lanes at Rose Garden Lane. To the south, the ramps to Utopia Drive/Yorkshire Drive would also decrease the southbound I-17 section to four travel lanes

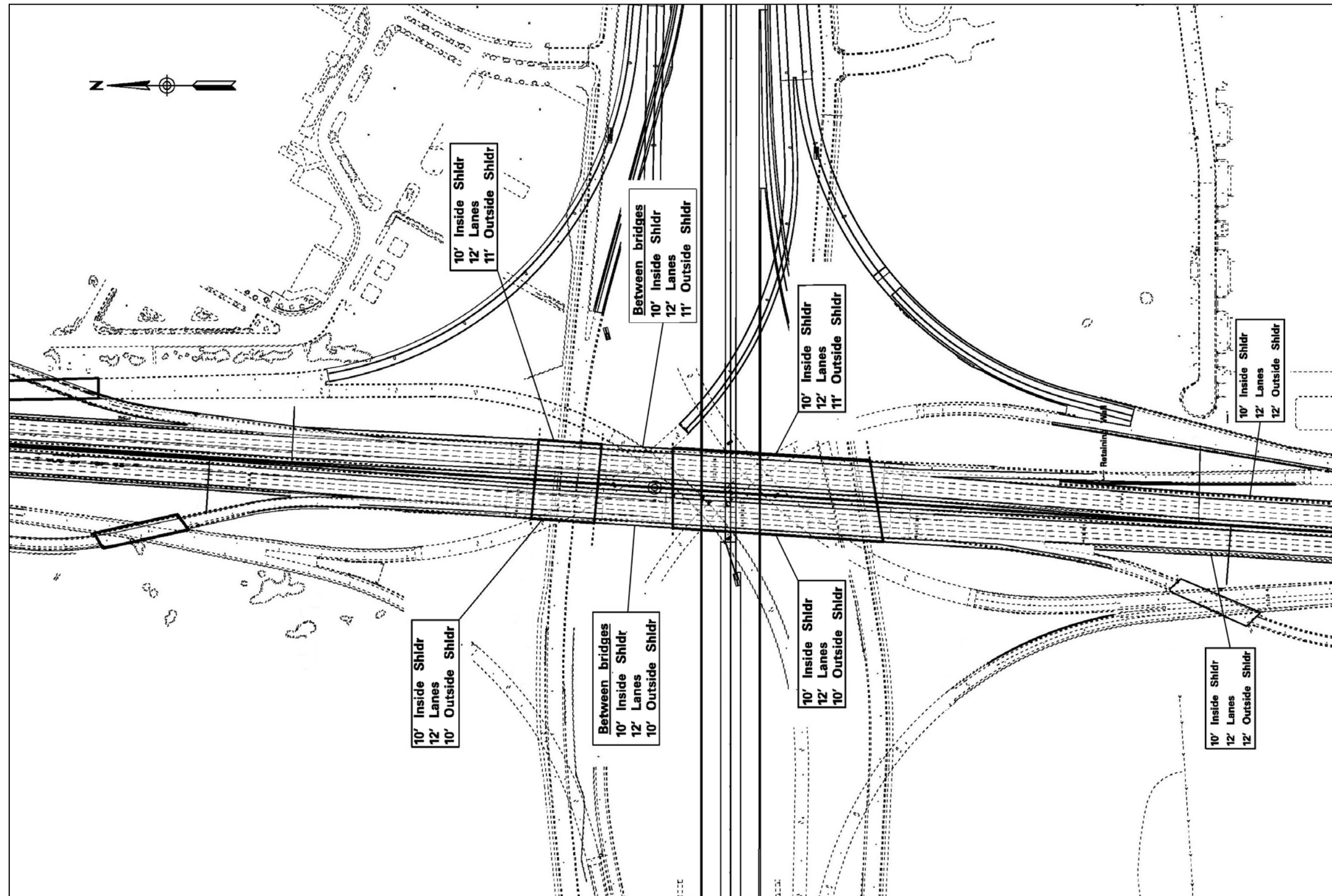


Figure 7 – SR 101L Traffic Interchange Improvements



(three general purpose travel lanes and an HOV lane) until additional lanes are added by the SR 101L ramps to the south. The proposed widening through the SR 101L TI would provide a 10-ft inside shoulder, four to seven 12-ft travel lanes, and a 10 to 12-ft outside shoulder in each direction.

South of the SR 101L TI, traffic lane drops would be required from the SR 101L directional ramp to southbound I-17 to match the existing lane configuration on the I-17 mainline. In order to provide adequate distance for the lane drops and to optimize traffic operations, the frontage road traffic destined for southbound I-17 from Yorkshire Drive would be directed through the ramps at the Union Hills Drive TI (MP 214.0). This would provide additional space on the Union Hills Drive overpass that would be utilized to accommodate the tapers for the directional ramp lane drops. No widening of the overpass or mainline approach roadway would be required.

Frontage Roads: One-Way Traffic Operations

This alternative would involve extending the existing frontage roads to provide continuous one-way frontage roads from Happy Valley Road to Carefree Highway, and converting the existing two-way frontage roads to one-way operations (Figure 8). As with the two-way frontage road alternative (page 17), the new roads would be constructed by the City of Phoenix in conjunction with the construction of new TIs at Jomax Road, Dixileta Drive, Lone Mountain Road, and Dove Valley Road. One-way frontage roads would also be constructed by the City of Phoenix between Pinnacle Peak Road and Happy Valley Road. The existing frontage roads would be converted to one-way operations as the TIs at Jomax Road and Dixileta Drive were constructed.

The new frontage roads would be 28 ft wide, with a minimum of 18 ft of separation from the I-17 mainline pavement. In some areas, a barrier would separate the frontage road from the I-17 mainline to reduce the need for additional R/W. This reduced cross section would be used in both directions between Rose Garden Lane and Deer Valley Road and in the southbound direction from south of Dynamite Road to north of the CAP Canal. One-way frontage roads would eliminate motorist confusion associated with headlight glare from oncoming traffic and accommodate intersections with crossroads and TI ramps without requiring a 0.25-mile offset from I-17. For these reasons, one-way frontage roads would operate more efficiently and require less new R/W adjacent to TI ramps than two-way operations.

A concern with one-way frontage roads is impeding convenient access to I-17. In the absence of a local street network, one-way frontage roads force some traffic to travel out-of-direction in order to access the freeway. However, the one-way frontage roads for this project would not impede access because they would not be constructed or converted to one-way operations until the local street network was extended to I-17 by the City of Phoenix and private developers. Thereafter, the local street network would provide additional routes and turnaround locations for traffic headed to I-17 in either direction of travel.

B. No Action Alternative

The No Action Alternative assumes that no major improvements would be made to I-17 from SR 101L to New River Road. Under the No Action Alternative, traffic flow within the study area

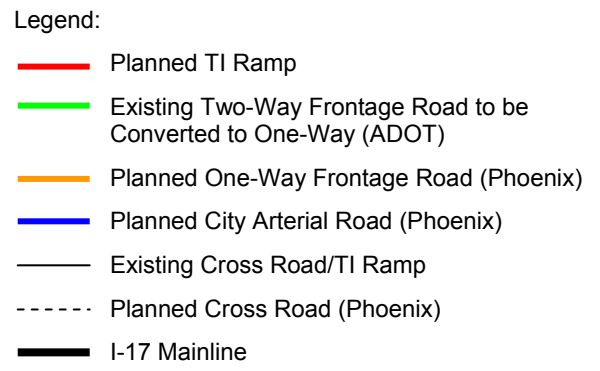
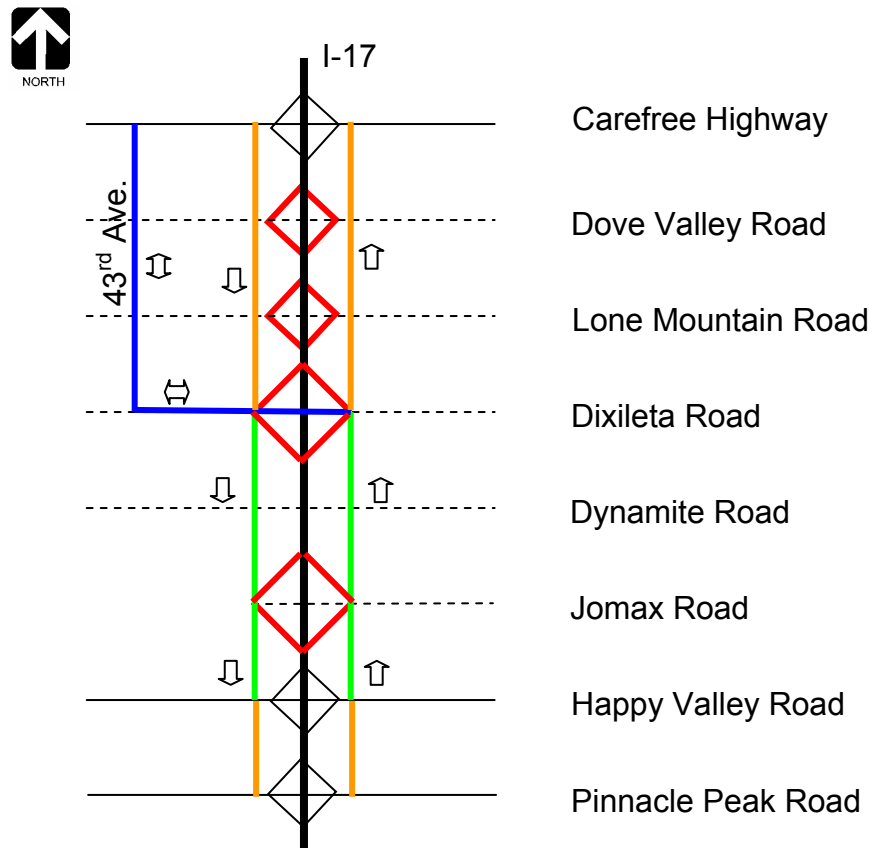


Figure 8 – Frontage Road Improvements



would continue to deteriorate due to increasing congestion. This congestion would be exacerbated in future years with traffic growth generated by ongoing land development and urbanization. As a result, the No Action Alternative would not fulfill the purpose and need for the project of reducing traffic congestion and improving the capacity and traffic operational characteristics of the existing route for regional traffic.

C. Preferred Alternative

The preferred alternative for improving the capacity and operational characteristics of I-17 between SR 101L and New River Road for each portion of the study area is:

- Mainline I-17: Inside Widening Alternative
- SR 101L TI: Adding Lanes with Bridge Widening
- Frontage Roads: One-Way Traffic Operations

The preferred alternative would:

- Minimize the amount of additional R/W required to construct the facility, thereby reducing potential displacements, community disruption, and R/W costs
- Require fewer modifications to overpass structures at existing TIs, thereby reducing project design and construction costs
- Minimize impacts to cultural properties, floodplains, waters of the U.S., and biological resources because the majority of the preferred alternative would be constructed within the existing disturbed R/W
- Not require modifications to the Skunk Creek hydraulic structure
- Avoid substandard lane and shoulder widths at the I-17/SR 101L TI, thereby maintaining smooth traffic operations
- Eliminate motorist confusion associated with headlight glare by eliminating opposing traffic operations on the frontage roads relative to I-17 traffic
- Optimize traffic operations in locations where frontage roads and TI ramps would link with the major arterial cross streets at existing and future TIs
- Improve traffic operations and roadway capacity throughout the project area to provide LOS C or better for predicted 2025 traffic volumes

